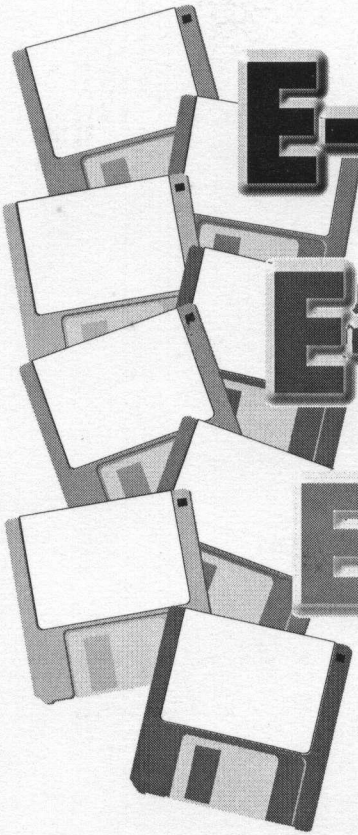


E-Copy
E-Copy
E-Copy

The Ultimate
Floppy Disk Copy Tool

by Robert Weiss

Another quality product from System Solutions

GENERAL INFORMATION

COPYRIGHT:

Software: © 1995, 1996 Robert Weiss

It is an infringement of the copyright to make any copy except for the sole purpose of a security backup.

Manual: © 1996 P 1996 Brandt Fernandes (Europe) Ltd.

All rights reserved. Reproduction or translation of any part of this work without permission of the copyright owner is unlawful.

Original text and Translation by Robert Weiss.

Editing and Artwork by Graeme Rutt.

Composed using DA's Layout TC on Atari TT and Falcon computers.

Printed by Rank Xerox on the DocuTech 600 dpi printer.

ENGLISH LANGUAGE DISTRIBUTION:

Brandt Fernandes (Europe) Limited trading as System Solutions
17-19 Blackwater Street, LONDON, SE22 8RS UK.
Telephone: +44 181 693 3355 Facsimile: +44 181 693 6936

LICENCE:

This software is licensed for use by one person on one computer system. The user undertakes not to make copies of the software or manual for resale or transfer. The user undertakes not to allow others to make copies for any reason. Any copies transferred to a third party constitutes a breach of copyright and a breach of licence and may result in legal action.

LIMITED WARRANTY:

This software and documentation is supplied "as is" and is guaranteed to be free from defects in materials and workmanship for a period of ninety (90) days from the date of purchase. The sole remedy for any defect shall be replacement and shall not encompass any other damages.

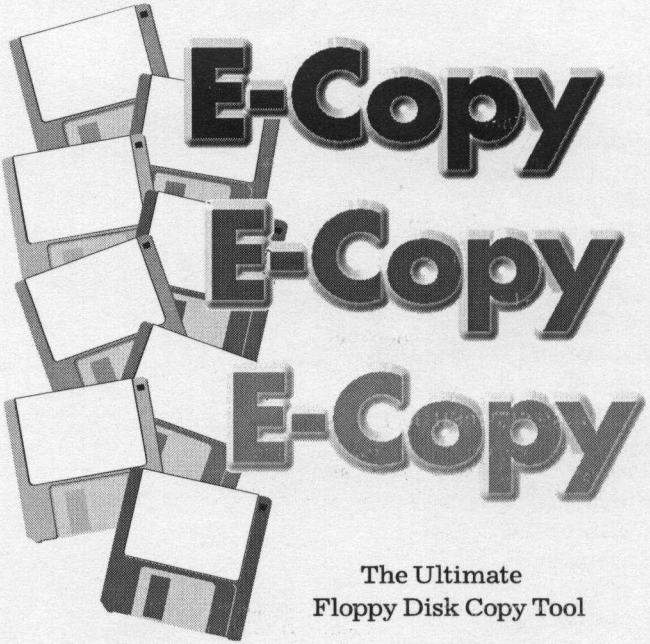
No liability can be accepted for any injury, loss or damage, direct or consequential, caused by any application or inability to use the product or information provided. The customer shall determine the suitability of the product before purchase and assume all risk and liability. Any dispute shall be subject to English Law.

TRADEMARKS:

ATARI, ST, MEGA, STE, TT and TOS are trademarks or registered trademarks of Atari Corporation.

GEM and GEM Desktop are trademarks or registered trademarks of Digital Research Inc.

All other brand and product names mentioned are trademarks of their respective holders and are acknowledged.



The Ultimate
Floppy Disk Copy Tool

by Robert Weiss

Contents

Introduction 5
Installation 5

Disk Theory 6

Basic Principles 8
The Main Window 8
The Menu Bar 9
The Process Window 9

The Main Window 11
Drive Set-Up 11
Source and Destination 11
Steprate 11
Manual Disk Parameters 12
Sectors 12
Tracks 13
Sides 13
Cluster Size 13
Main Options 13
Used only 14
Get disktype 14
Format destination 14
Multiple jobs 15
Fast format 15
Verify 16
IBM - Compatible 16
Analyse destination 16

The Options Menu 17
Formatting Parameters 17
Directory entries 17
Optimise FAT length 17
Fast load format 18
Automatic gaps 18
Generate user-defined format 19
Drive Parameters 19
Access via: 19
HD/ED mode 20
Attempted accesses 21

Dynamic steprate 21
Settling delay (30ms) 21
Memory Management 22
Virtual memory 22
Reserve min. memory 23
User Screen 23
Security questions 23
Procedure display 23
Dialogs 24
Userdefined Formats 24
Sector Layout 24
Gap sizes 26
Boot Sector 26
Online virus checker 27
Boot sector 27
Load boot sector 28
Save boot sector to file 28
Save Settings 28

Actions 29
Copy 29
Transcopy 29
Format 29
Clear disk 30
Read/Write 30
Create Image file 30
Read Image file 30
Clear buffer 31
Directory 31
Analyse disk 31
Test disk 33

The Standard Buttons 34
Activate standard button 34
Set standard button 34

Error messages 35

Appendix 36
The Keyboard 36
MS-DOS Compatibilty 36
Tips and Tricks 37

Acknowledgements

I'm personally indebted to Jürgen Stessun who contributed most apart from me to the development of this program. His never-ending stream of ideas, his endless tests, and the sharing of all the knowledge helped to create E-Copy the way it is now. He owns the credit for the track layout, the options "Additional headers", "Automatic gaps" and the technique of different spiral factors.

Claus Brod has to be thanked for the unique, unusually funny and instructive "Scheibenkleister II" containing the tips to program floppies (LOCKSLEY).

Thanks to Olaf Meisiek, whose program INTERFACE and the library MYDIALS which have contributed to the appearance (flying Dialogs, 3-D objects) of E-Copy. (Copyright (c) 1991 by Olaf Meisiek).

Harald Sigmund has to be acknowledged for his international keyboard routines.

And finally thanks to the testers: Berhard Artz, Stefan Becker, Robert Federle, Christian Felsch, Andreas Frank, Volker Hüttenrauch, Klaus Kiesewalter, Stefan Kilian, Gerd König, Hansi Richstein, Oliver Scheel, Uwe Seimet.

Registration Card

Please fill and send the enclosed registration card to the distributor. E-Copy is a product which is continuously in a state of development, so your wishes and ideas are always welcome. Only registered users have the opportunity to get updates at special prices.

Hotline

If you have any problems with E-Copy please refer to this manual first. If this does not solve the problem we are ready to help you. Please have details of your system configuration (type of computer, memory, drives, HD-module etc.), version and date of E-Copy handy.

Please Telephone or Fax your local dealer when you have this ready.

Introduction

Welcome to E-Copy, the only floppy disk copying tool you will ever need on your Atari. This manual will lead you painlessly through its various functions, explaining each in detail.

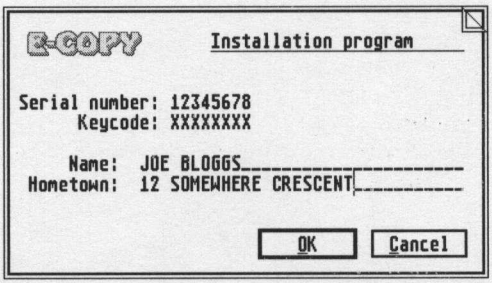
We assume that you are familiar with basic operation of your Atari and the GEM graphics user interface. If not then refer to your Atari manual. Please read the README file on the disk, it contains any information about E-Copy which did not make it into this manual.

Installation

Insert the original E-Copy disk and start INSTALL.PRG on this disk. You are asked for the following information:-

A serial number, you'll find this 8 digit number on the original disk and also on the registration card.

A keycode, which you have to invent, this is a private and personal code.



Your name and hometown, this may be up to 32 characters long.

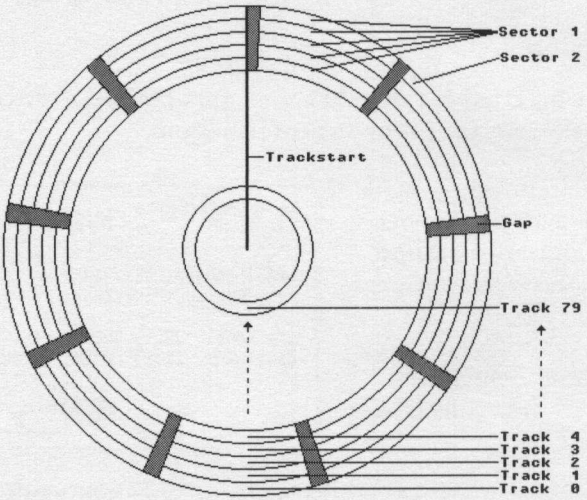
If all this is correct, click on **OK**. Then re-affirm that your choices are correct. Your serial number and keycode are then checked and, if successful, ECOPY.PRG will be set up with your address.

NOTE: When installing directly from the original disk make sure write protect is inactive (corner tab up).

After the installation procedure, we recommend that you make a backup copy from the original E-Copy disk. Use only the backup and keep the original safe. If you work with a harddisk copy ECOPY.PRG to the desired directory. If you want to use E-Copy as an accessory, copy ECOPY.PRG in the root directory of your boot drive and rename it to ECOPY.ACC. Reset to use E-Copy as an accessory.

Disk Theory

A disk is basically a plastic housing for a magnetic pancake, made from the same stuff you find in audio cassette tapes. It has two sides, called side 0 and side 1. On a new disk there is no structure in which to store data. The structure is created by "formatting". This generates "roads" for the read/write head called tracks, depending on the disk drive up to 85 tracks are possible. These tracks are subdivided into several sectors, which contain the actual data.



Every sector normally stores 512 Bytes. But the beginning and end of a sector have to be defined to enable the drive to find a precise location of the sector. This is the job of the formatting option of the program - you do not have to worry about it. The standard format, as generated by the Desktop has 9 sectors per 80 tracks resulting in a total of 720 Kbytes of storable data on a double-sided disk.

However, using different formatting software (including E-Copy), it's possible to use more than 9 sectors and 80 tracks to enable your disk to store more data. Unfortunately, as you use more sectors and tracks the chances of disk corruption increase. We suggest that you do not go over 10 sectors and 82 tracks.

You can increase your disk storage in other ways, for example by using

different types of floppy disk drives. You can pack 22 sectors per track on a (HD) high density disk resulting in a total capacity of 1.6 Mbyte. This is achieved by doubling the clock frequency for the floppy disk controller (FDC), it runs with 16 MHz instead of 8 MHz. It reads and writes twice as fast resulting in the double capacity of the disk.

Meanwhile, extra high density (ED) drives are available which use 40 sectors per track at an FDC rate of 32 MHz, which translates into 3.3 Mbyte per disk with a ST/TT. These disks are read eight times faster compared to disks created by the Desktop. Naturally, this requires that all components (FDC, the format program, the HD/ED module, the disk drive and the disks) work together properly.

Most standard formats are provided by E-Copy and can be selected by the keys F1-F8. But you can adjust these defaults to your own needs. The 10, 20 and 38 sector formats are recommended as they are the fastest and safest. But avoid to choose more than 82 tracks, as problems are likely when interchanging data (DOS, for example, uses only 80 tracks with 9,15 or 18 sectors).

In addition there are some sectors on a disk which are used for administration of the data These are the boot sector, the FAT (File Allocation Table) and the root-directory.

The boot sector contains information about the layout of a disk - the number of sectors per track, tracks per side, number of sides, directory size & FAT size. The directory holds information about files, folders and the label of the disk (if it exists) with name, length, date, time, status and the starting cluster in a 32 byte field.

To keep the administration of this disk data a bit more independent from the hardware, a new unit has been introduced: the cluster. The boot sector knows how many sectors make up a cluster. For every cluster of the disk the FAT holds a 12 bit FAT entry, indicating the status of the cluster (free, used, bad or end of file).

Every directory entry contains the number of the first FAT entry of a file. This first entry contains the number of the next entry used by this file and so on until in the last entry of this chain a special number indicates the end of the file. It is important to know that cluster size means the number of sectors in a cluster, and that Ataris generally use 2 sectors per cluster instead of MSDOS which uses only 1 sector per cluster. The rest of the sectors are used for data storage.

Basic Principles

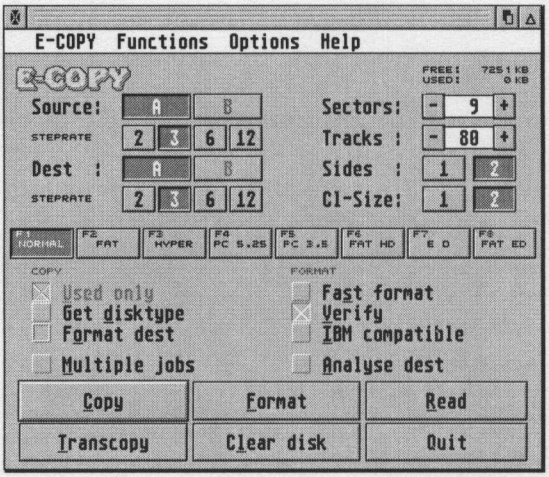
E-Copy was designed to be quick, easy and safe to use. However, the numerous options may cause confusion at first sight and - especially if you are a novice - a lack of understanding could lead to data loss. Therefore we recommend strongly that you check with this manual before using any of the options you might see in the program - in fact, we suggest that you read the whole manual before using E-Copy at all.

The manual has been written for this purpose. It's all too easy - and enticing - with a new program to go "button-clicking mad". But we remind you in this instance that you are dealing with your floppy disks - which will probably store your most important data!

The program is split into 3 main sections, the main window, the menu bar and the process window. Each are explained briefly below. Detailed descriptions of each of these areas take up most of the rest of this manual.

The Main Window

When you first run E-Copy you are presented with this dialog box. We call it the Main Window because this is where all the action takes place.

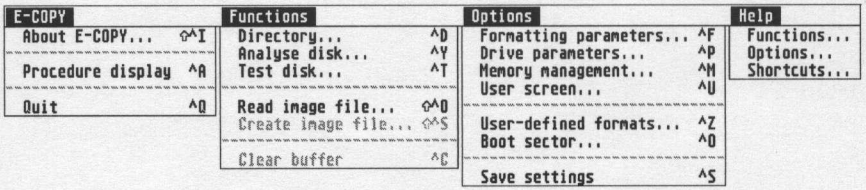


Here you can set up your disk, directly access the most used options and perform the various functions (**Copy**, **Format**, **Transcopy** etc.) that E-Copy is capable of.

The main window is described in detail in the next chapter, called, unsurprisingly, "The Main Window".

The Menu Bar

The words **E-Copy**, **Functions**, **Options** and **Help** all lead to pull-down menus. To access them you click on the menu titles with your mouse button.



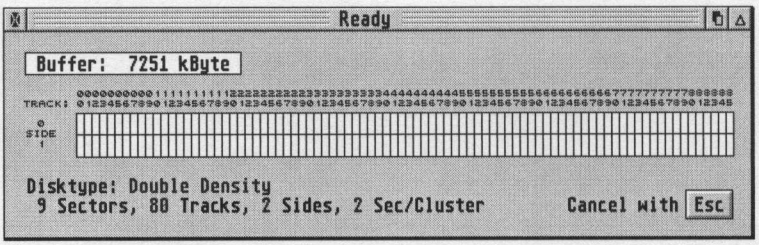
The menus which appear let you access various things. Most important are the **Functions** and the **Options**. The former are dealt with in the "Actions" chapter and the latter have a chapter all of their own, "The Options Menu".

The **Help** menu is a little different - containing links to three different dialog boxes full of useful information. They are meant to act as reminders so you do not have to constantly refer to the manual.

You can also access the various menu options via the keyboard. For example, **^Y** is the keyboard shortcut for **Analyze disk** and means, "hold down Control and hit the Y key". **⇧^I** leads to the **About E-Copy** item and means "hold down Shift and Control and hit the I key".

The Process Window

In this window you can see the progress of whatever function you have chosen to work on your disk. It's divided into the two sides of your disk (top and bottom) and up to 86 separate tracks (left to right).



As the work progresses the colour of the tracks will change, as follows:-

		Colour Mode		
		mono	*4-colour*	*16-colour*
Activity	*format*	75%	black	blue
	read	50%	green	green
	write	75%	black	dark red
	error	25%	red	red

The following status messages may also be displayed:-

Writing disk system sectors

- FAT and directory are being written.

Reading disk system sectors

- boot sector, FAT and directory are being read.

Checking type of drive

- this checks if your hardware can process the selected option.

Ready

- you may continue

The memory available to E-Copy is shown, to the left. If you do not have enough FastRAM or a harddisk (or you want to **Copy** from one drive to another) you need at least 500KByte free without having to change the disks all the time. All the other functions only require about 20 -50 KByte.

The reading test gives the mean reading speed in real time, and shows you the faster formatting speed of E-Copy compared to the Desktop.

The density of a disk resulting from the number of sectors per track is shown in **Disk type**. However, when formatting the disk, density is evaluated by a hardware detection. This avoids, for example, formatting a DD-Disk with 9 sectors in a drive which is in HD-mode, in this case E-Copy displays an error message.

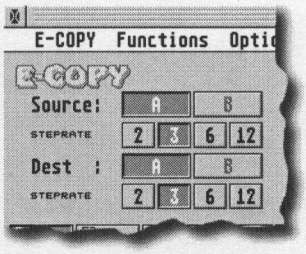
You may interrupt any process with the Escape key.

The Main Window

Drive Set-Up

Source and Destination

In the **Source/Destination** box you can select the drives for the source and destination disk. Normally **A** refers to the internal drive and **B** to the external drive connected to your Atari via a lead. If you have only one drive, this means that source and destination drive are the same, that is, **A**. In general the source drive is used to read or test (source for **Copy**, **Transcopy**, **Test disk**, **Analyse disk** and **Directory**). The destination drive is used to write (destination of **Copy**, **Transcopy**, **Format** and **Clear disk**).



Steprate

Below the drive buttons there are four buttons for the steprate. They contain strange numbers (**2**, **3**, **6**, **12**), which indicate the time in milliseconds (1/1000s) in which the read/write head is moved from one track to the next. If you have had enough disk theory you can skip the following details, and adjust the steprate according to the table.

The steprate is the time the FDC (floppy disk controller) allows the disk drive to change between neighbouring tracks. If the FDC is in HD mode (the FDC runs twice as fast, that is, 16 MHz instead of 8MHz, meaning it works double speed) the execution time is reduced from 3ms to 1.5ms. For many drives this is too fast, they tend to forget some steps. The trick now is to set the steprate to 6ms, which gives 3ms in HD mode. Good high-density modules always adjust the right steprate, so you can leave it to 3ms in E-Copy. But you should refer to your HD drive's manual or ask your retailer. If you are not quite sure, a wrong steprate is indicated by a louder and "unnatural" sound when the read/write head moves across your disk.

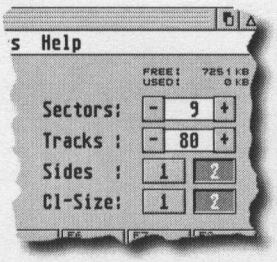
The normal settings are:

sector	steprate
1-11	3ms
12-22	6ms
23-44	12ms

Many HD modules are supplied with an AUTO Folder program which sets the steprate of TOS automatically. This software has no effect on E-Copy as it uses its own routines for the sake of speed. The steprate is saved internally, not for source and destination, but separately for drive A and B. This means if source and destination are set to drive A and you change the steprate of the source the steprate of the destination will also be changed. This causes a problem if you want to copy a 9 sector disk onto a 18 sector disk in the same drive. In this case you should choose a higher steprate.

Manual Disk Parameters

The Atari floppy disk system is pretty flexible compared to DOS machines. It can handle any amount of sectors and tracks (dependant on your disk mechanism), as well as varying number of sides and cluster sizes. With the buttons to the top-left of the main dialog you can create your own special formats.



These figures will be ignored, however, if you have **Get disktype** selected, or if you use **Transcopy**, **Read** or **Test disk**. They are used mainly for formatting disks to a specific format, using E-Copy's super fast formatting function.

Sectors

As already mentioned the maximum number of useable sectors per track depends on the hardware, specifically the type of Atari and drive mechanism. E-Copy checks if the maximum possible number of sectors is not exceeded before formatting a disk (also when copying a disk with formatting turned on). If this is the case you are asked to adjust the tactrate of your drive.

Tracks

The maximum number depends on the ability of your drive (ie. how far the head can be moved close to the centre). For all drives a minimum of 80 tracks is guaranteed but some can do more, for example, all TEAC drives can do 82 tracks (NEC even 86) without any damage.

To prevent any damage we supply GETMAXTR.TOS on the E-Copy disk, which checks for the maximum number of tracks to be used without danger. The head is moved to the mechanically most centred position, but use this program with caution. Several of these procedures may de-adjust your head, and a new drive is cheaper than readjusting it. So take care to follow the instructions.

Sides

Single sided drives can only read/write one side of a disk. Early Atari's came with this type of drive. But all recent models come with a double-sided mechanism. Machines with single-sided drives are now quite rare.

Cluster size

As described in Disk Theory, TOS uses clusters instead of sectors as the minimum unit of data it will use on a disk. Ataris use 2 sectors per cluster as this reduces administration and optimises the usage of disk space. As already mentioned, DOS machines use only 1 sector per cluster (apart from the 9 sector format which uses 2!). If you intend to use one disk on both systems you should select 1 sector/cluster, otherwise the file-administration is erratic as some DOS machines don't use the boot sector data, containing the information about the cluster size. The Atari has no problem handling both sizes.

Main Options

Beneath the disk set-up and the function-keys you will find the main options, those which are so important that you need to be able to get to them quickly. They offer the chance to change the way that various functions are performed. Those to the left change the way **Copy** operations are performed and those to the right change the way that **Format** operations take place.

Used only

This option effects the reading of a disk. Usual copy programs simply read the whole disk, a procedure often unnecessary as a disk is not always filled to the limit with data. When this checkbox is selected E-Copy reads only those sectors which contain data. E-Copy retrieves this information from the FAT of the disk, saving time and memory.

You will be able to see the difference this makes in the Process Window when reading or writing a disk. If you find many holes in this display in means that your data is distributed all over the disk. In this case you should use a "disk optimiser" which sorts the data to reduce the access time to the individual data. **Used only** is automatically deactivated when **Get disktype** is switched off, as no format information is read - that is, no FAT information is available.

Get disktype

When you want to copy a disk you do not really need to know the format. You just want to put in a source and destination disk and watch merrily as your data is copied across. Enter the **Get disktype** button, with this selected the sectors, tracks, sides and cluster size are set automatically for whichever disk you put in your drive. This is done by reading and analysing the boot sector of the disk.

However, for technical reasons there are two exceptions. The first is when formatting, where you will normally wish to set your own format parameters - **Get disktype** is ignored. The second is when using the **Transcopy** function, as this is specifically used for copying data from one format to another there is little point in using **Get disktype**. See the relevant section below for a description of **Transcopy**.

Format dest

This is a Tri-state-button, it can take three meanings, on/off and a intermediate meaning, testing format. With **Format dest** you are able to format and write the destination disk in one go. This saves time and you do not have to bother about the correct format of the destination disk, E-Copy automatically sets it to same as the source disk. An

exception is when you are copying to a new format, but more about this in section about **Transcopy**.

This option is only used when you **Copy** or **Transcopy**, as we assume that you do not want to format when you **Analyse** or **Test** a disk!

The intermediate meaning of the button, "testing format" is a more subtle version of **Format dest** With this button active the destination disk is formatted only if E-Copy thinks this is necessary. The decision is made upon the data in the boot sector of the destination disk, it will be formatted in the following cases:

- no boot sector present
- number of sectors/tracks is too small
- number of sides is too small
- number of tracks is too small

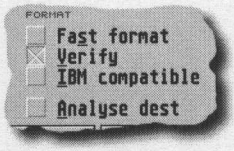
Multiple jobs

As the name implies, this option enables you to **Copy**, **Format**, **Write** or **Clear** more than one destination disk. You will be prompted to insert as many disks as you want (until you hit **Cancel**). If, whilst copying, you are unable to contain the whole source disk in memory you may still use this function. Simply copy the first portion of the source onto as many disks as you want and then hit **Read On**. This will read the second portion of the disk and will prompt you to insert all your destination disks. Repeat this process until all the source has been copied across.

Fast format

To speed up the formatting process by 50% for all standard formats (9, 15, 18 and 36 sectors) select this option. Note: there may be problems with disks which have already been formatted.

A normal disk holds 6256 bytes per track. If it has been formatted with only 9 sectors (9 sectors equal 9 * (512 + 72 for sector gaps) = 5256 bytes), this leaves 1000 Bytes at the end of the track, which may not be used at all. These 1000 bytes give the head enough time to hop onto the next track to continue the formatting process without having to wait for the next rotation of the disk to get to the beginning of the next track.



This enhances the formatting process as you need only one rotation of the disk per track. But if the disk is already formatted parts of the old format may survive in these 1000 bytes at the end of the track. Eventually this may cause errors when writing/reading (for example, sector number 9 may exist twice!).

Therefore it's best to use it only with fresh disks!

Verify

If you want to format a disk in a safer way, use **Verify**. This causes E-Copy to check for bad sectors just after a track has been written or formatted. This is time consuming and slows down the **Format/Copy** process, but it is recommended for disks which will have to carry important data.

IBM - Compatible

As already mentioned, the Atari can read and write to more kinds of disk format than DOS can. If you want to exchange data between these two worlds you must ensure a DOS compatible format. This is provided by this switch. When active only compatible formats can be set manually and when copying (with **Get disktype** selected) an error message occurs when an incompatible format is used. For more details about DOS compatibility see the Appendix.

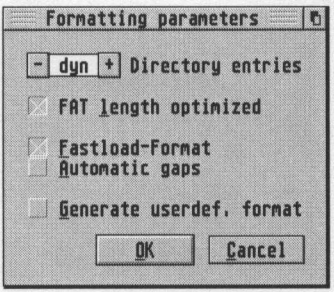
Analyse dest

This is (almost) the opposite of **Get disktype**. With this button selected the destination disk is checked for data before any destructive operation (**Format**, **Write**, **Clear**, etc.) If data is detected E-Copy will give you a warning and you can take a look at the directory of the disk, if required. This protects you against data loss but it does take some time to analyse the destination disk.

The Options Menu

The **Options** menu contains those options which are generally more "static" than those described in the last chapter. You will probably want to set them up once and then hardly touch them again, unless you change computer systems or are using E-Copy for complicated and varied tasks.

Formatting Parameters



The buttons in this dialog have effect on the **Format** function and partly on the **Clear** function (only **FAT length optimized** and **Directory** entries).

Directory entries

The number of files and folders in a top directory of a disk or harddisk is limited, because the size of the root directory is fixed. Subdirectories however are flexible and may contain an unlimited number of files. This option allows you to set the number of entries you need (a file/folder uses one entry).

In general it does not make sense to choose more entries than normal, that is, by having E-Copy calculate them "dynamically". It is easy to make up more subdirectories if you need to store more files on a disk.

Dynamic calculation:

sectors	entries
1-11	112
12-22	224
23-44	240

Optimise FAT length

The operating system uses a generous 5 sectors per FAT, independent of the number of clusters it has to administrate, that is, the number of clusters that will can be stored on a disk.

A standard TOS disk (9 sectors, 80 tracks and 2 sides) has 9 x 80 x 2 = 1440 sectors. A cluster size of 2 sectors means 720 clusters have to administrated by the FAT. Every cluster uses 12 bits (= 1.5 bytes) resulting in 1080 bytes per FAT. With 512 bytes/sector you get 1080/512 = 2.11 sectors => 3 sectors. Now every disk has a copy of the FAT, making 4 sectors giving 4 x 512 = 2048 bytes that could be saved.

Other areas of the disk are also not administered by the FAT (the FATs themselves, for example) so there is even more space going to waste.

With this item selected E-Copy will take into account these factors (and others) and will optimise the size of the FAT to grab back that wasted space.

Fast load format

More disk theory, I'm afraid, involving a new term - additional headers. If you are not interested skip the details, the only thing you need to know is that disks with additional headers can be read and written to more quickly than those without.

To explain additional headers we have to explain the reading technique of the FDC. If the FDC wants to read a track it steps to the nearest head of a sector, which contains the sector number, track, side and track number. If it is the correct track it looks for the next sector on this track until the right sector is found.

But after reading a track, the disk head is normally somewhere in the first data sector - generally the one it's searching for, and by that time it's too late and the disk has to rotate around again. This is where we use additional headers. An additional sector head is introduced before sector number one (the one used to check for the track) and has a phantom sector number. This allows the FDC to check for the right track, and subsequently the next sector it reads is usually the one it's searching for.

Automatic gaps

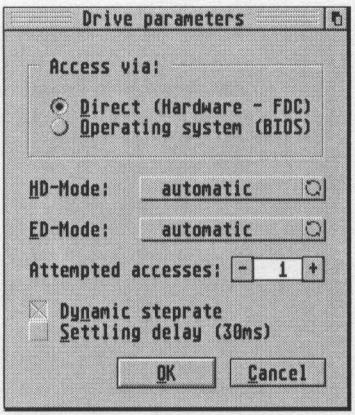
A gap describes the distance between the end of a sector and the beginning of the next sector. If a drive runs at a slightly non-standard rotational speed, it is possible that a disk formatted with it may be unreadable, or only partially readable by other drives. With **Automatic**

gaps active, E-Copy distributes the sectors evenly over the track, calculating correct gap sizes. This only makes sense for formats with 11 or 22 sectors, because small gaps are used which are more sensitive to the rotational speed of the drive. This should solve the problems with these formats. We do not recommend you use this option with ED drives, as they react badly to gaps other than the default sizes.

Generate userdefined format

This enables you to choose manually between the formats as defined in the special format dialog and the ones integrated in E-Copy which have been proven to be reliable. With this option active you can format up to 41-44 sectors per track. At the moment all FDC with ED ability (AJAX) produce errors with small sector gaps, so these formats are not yet possible. Hopefully in the future Western Digital will develop an AJAX which does what it claims to!

Drive Parameters



These settings take care of the way that E-Copy uses the hardware in your computer.

Access via:

The **Direct - (Hardware - FDC)** item makes E-Copy use the hardware in your computer directly - hardware registers in the FDC and DMA are written directly to **Copy**, **Format**, etc. This is much faster than going through the operating system and is totally compatible with all current computers made by Atari. Alternatively with the advent of Atari emulators on other computers (MagiCMac, Janus, etc.) programs can no longer assume that they can hit the hardware directly - the hardware literally no longer exists! Therefore it's vital that programs have the option to use the operating system exclusively - this is done in E-Copy via the **Operating system (BIOS)** button.

However, the standard operating system does not allow quite as much flexibility as the hardware. In this mode you cannot do the following:

- fast format
- fast load format
- automatic gaps
- generate user defined format

The following settings are not used:

- switching between HD/ED modes
- setting the step rate
- settling delay

HD/ED mode

These options tell your machine how to switch between the different drive modes, double-density, high-density, extra high-density, etc. HD and ED mode are handled separately by E-Copy and before every operation each of them is switched to the selected position. Therefore both modes should not use the same PSG BIT. For detailed information please refer to your HD/ED manual or speak to your dealer.

automatic is for those HD/ED modules, which automatically switch between these densities, like the one by System Solutions. Here the drive's disk identifier is used. In this case the switching is done by the hardware and not by E-Copy.

TT compatible should be selected if you use a TT, Falcon and those MegaSTe's which came with a HD drive. The hardware is already prepared for high density, the switching is done by an (unfortunately) undocumented register. If there are any problems with newer models of Atari computers E-Copy will be updated. These machines are not equipped with an ED switch, so this button is omitted.

PSG Bit 6/7/On/Off is the option to select if your ED/HD module is selected using a pin on the sound chip (PGM) The Bit 6 corresponds to pin 15 and bit 7 to pin 14 of the PGM. Okay? Now all you have to find out is when your module is in which mode - consult your manual or ask your dealer. A logic low or 0 means in this case "Off" and logic high or 1 "On".

Attempted accesses

This option allows you to set the number of attempts for reading/writing bad sectors from 0 to 99. The higher the figure, the longer it takes to identify a bad sector. If you choose a value of 0-2, the time to identify bad sectors is acceptable. Higher values are only of advantage if you want to retrieve important data from an antiquated and all but dead disk.

It takes some time for E-Copy to give the results for a bad disk with many sectors, depending on the values. This is because the multiple checking of every single sector may take up to two seconds per sector. This adds up to 1.5 minutes for 40 sectors - E-Copy is designed to work very thoroughly.

Dynamic steprate

The step rate can either be set manually or you can do it automatically by activating this option. E-Copy will choose the right step rate for you by calculating it from the steprate table (see the last chapter). It will show you the setting it has chosen in the main dialog.

This also works for two different step rates for one drive, when the disk is changed the step rate is updated automatically.

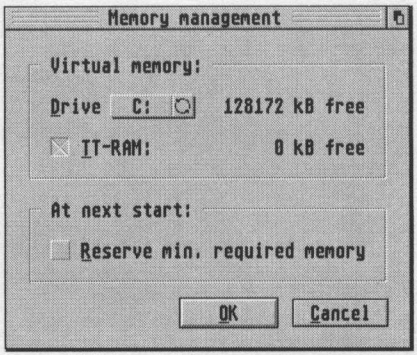
Settling delay (30ms)

This option settles the read/write head before every operation for 30ms to reduce vibrations of the head. This avoids incorrect reading of sectors - especially in older drives. The delay corresponds to one rotation of the disk, so slows down your disk quite dramatically. If you frequently encounter bad sectors try this option.

Owners of TEAC drives should not use this option as these drives regulate the problem internally and may have synchronisation problems with this option switched on.

Memory Management

This dialog enables you to set up all the memory parameters required by the program.



Virtual memory

Enables you to use a GEMDOS hard disk partition, a RAM disk or TT-RAM (FastRAM) as a buffer memory for **Copy** and **Transcopy**.

The **TT-RAM** option will use "FastRAM", if you have any installed. Strictly speaking TT-RAM is real, not virtual, memory but cannot be used directly by the DMA or FDC chips due to the way the hardware in Atari computers is organised. You can, however, use TT-RAM as a memory store with this selection. Because it's real memory this is much faster than using your hard disk as virtual memory.

Note that not all Atari computers have TT-RAM, only TTs (obviously) and those which have had certain kinds of extension cards added (for example, the BlowUP Falcon eXtender) have this type of memory.

The **Drive** pop-up enables you to select a drive which is used by E-Copy to write the data into a file. This operation is handled via GEMDOS and not directly via the disk drive. **Free** shows the available disk space on the selected partition.

Virtual memory will only be used if the following criteria are met:

- only one drive is used, that is, disk changing is not required.
- the data to be read does not fit completely into free ST-RAM
- the capacity of the partition is bigger than the free memory space.

If all these conditions are fulfilled, a file is opened on the selected partition or TT-RAM is used. When **Copying** or **Transcopying** the ST-RAM is used until it is full then the virtual memory is used. If more than one pass is required (you do not have enough RAM of any type) E-Copy will repeat the process until the destination is entirely copied over.

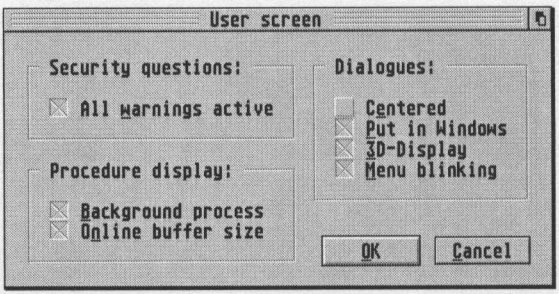
Reserve Min. required memory

To use E-Copy as an accessory with programs that require all available memory (for example, Calamus or First Word Plus) you can reserve a minimum amount of memory (around 50 KByte) for formatting, erasing and testing. This option is only used when you run E-Copy as an accessory - and you must save the settings and re-boot before it becomes active. Conversely, there is no way of giving the memory back to the operating system apart from changing and saving the settings and then re-booting.

User Screen

This is used to set up the way you interact with E-Copy and the way that E-Copy will display its various dialogs.

Security questions



Whenever your disk is about to be written to (**Copy**, **Format**, etc.) E-Copy will warn you with a dialog box. This is preferable and safe but causes delays as the program waits for you to click the mouse on the dialog. If you are a real speed-demon you may wish to turn this option off - in which case no warning dialogs will be shown.

Remember though, this is a great way to lose your data. Even expert speed demons get their disks mixed up from time to time!

Procedure display

Under multi-tasking operating systems, or when using E-Copy as a desk accessory **Background process** will make the various functions of the program happen "in the background". This means that you can carry on editing a text file (or whatever takes your fancy) whilst E-Copy carries

on **copying** or **formatting** a disk. This is a very powerful feature - especially when tied in to the iconify button (the triangle icon at the top right of the window, available under MagiC and MultiTOS) which can minimise the size of the E-Copy display.

You should note that when using E-Copy as an accessory you cannot start new programs when E-Copy is carrying out an action. This limitation is not true under MagiC or MultiTOS.

Selecting **Online buffer size** opens a real-time display of the available memory when **Copying** or **Transcopying**. When deselected, the memory is only shown at the beginning and the end of the process. Switching it off may slightly speed up the process, especially on slower Ataris.

Dialogs

The methods used to display dialog boxes may be changed with these checkboxes. Dialogs may be **Centred**, they may be **Put in Windows** or they can be shown in the now common **3D display** style (in 16 or more colours). Note that the **3D display** will only be used when you save and re-start the program.

Of the three, **Put in Windows** is probably the most important. With the item selected E-Copy's various dialogs are "amodal". This means that they appear in windows (which can be moved) but more importantly, they do not block access to other program's menus and dialog boxes.

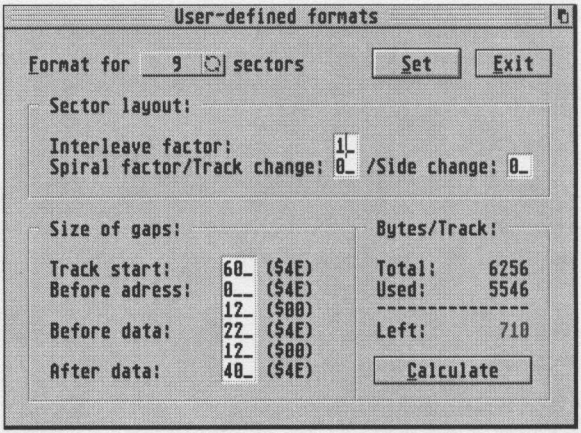
User-defined Formats

Here you can create your own disk format. For every individual number of sectors you can change the gap size and the layout of the sectors and save them in ECOPY.INF. The internal E-Copy values are available as defaults, to give you a basis for your experiments. Select the sectors and choose the format you want to edit.

Sector Layout

The layout of sectors on a track is described by the **Interleave factor** and the **Spiral factor**. Sectors on a disk do not have to be sequential. That is, sector 2 does not have to follow sector 1, sector 3 does not have to follow sector 2, etc. Instead, the **Interleave factor** is used to describe the physical

sequence of each logical sector. An **Interleave factor** of 2 results in a layout of 1-3-5-7-9-11-2-4-6-8-10, a factor of 6 would result in layout of 1-7-2-8-3-9-4-10-5-11-6. And, as you can see, a factor of 1 would result in a truly sequential layout.



So what's the point of ever straying from a sequential layout? Well, if you have very small inter-sector gaps you may find that your hardware is not ready to read sector 2 after it's read sector 1. This would result in a whole rotation of the disk before it got back to sector 2 again. If the disk was formatted with an **Interleave factor** of 2 then it would only have 5 or 6 sectors (roughly half a revolution) to turn before it got to sector 2.

You will find that most modern drives will happily cope with an interleave factor of 1 - but if your reading speed is too slow you might want to experiment with higher interleave factors.

The **Spiral factor** is the offset by which the physical sequence of sector numbers is shifted from one track to the next. This allows also to solve the problem mentioned in the section that describes the fast load format.

For example, track 1 has the sequence 1-2-3-4-5-6-7-8-9 and track 2 the sequence 8-9-1-2-3-4-5-6-7, resulting in a **Spiral factor** of 2. Thanks to Jürgen Stessuns this trick became more sophisticated by using a different **Spiral factor** when you change tracks and sides. This is because a change of sides is faster than a step to the next track. Roughly you can say that the more bytes that are left at the end of a track the smaller the **Spiral factor** should be.

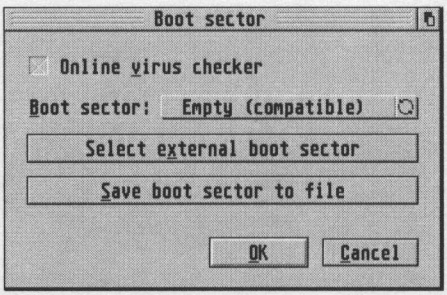
Gap sizes

Unfortunately there is no basic rule regarding **Gap sizes**, you have to experiment. It is important to have the gap between address field and data field at least 34 Bytes long. Otherwise the FDC gets confused which is exactly the problem. According to the EPSON specifications of the ED format this gap has to have 53 bytes (41 x $4E and 12 x $00). However, the "ED compatible" FDC does not know how to handle this. This means that ED disks formatted on MSDOS computers can not be read on an Atari. The opposite should work, but we have not been able to test it. If necessary format the disk with an Atari.

If you have changed the gap size you can press **Calculate** to display the resulting track design. Make sure you always have some bytes left as the track length may change from drive to drive.

If you have set the format up correctly you can now hit **Set** to tell E-Copy to use them. Make sure that **Generate userdef. format** is selected in the **Formatting parameters** dialog and hit **Format**. We recommend strongly that you then check the disk, for both errors and speed. If you manage to create a faster format than the internal E-Copy one then contact us immediately!

Boot Sector



This dialog box enables you to set up your disk's boot-sector. The boot sector is the portion of the disk which is read when you boot your computer. It describes the disk to the operating system and may also contain a small executable program (often used to automatically run games). Unfortunately, it can also be used for nefarious reasons - the infamous boot sector virus - which you can protect against with E-Copy.

Online virus checker

Some people are terrified by computer viruses. Most of this panic has been caused by the media, wishing to whip up fear and misunderstanding (and make money in the process).

From experience we can tell you that the problem on the Atari is not large. The only well known viruses are the "PD Virus", which simply replicates itself and the "Mouse Virus" which occasionally inverts the movements of the mouse.

The probability of your hard disk suffering a head crash is much higher than that of your data being eaten by a malevolent virus.

However, after calming any fears you may have it would be foolish not to acknowledge at least a small element of danger. Therefore, you have the option to turn on the **Online virus checker**. If active this will check for 15 of the best known viruses and will warn you if it finds one on any disk you put in your drive.

Boot sector

This pop-up menu enables you to define the type of boot-sector E-Copy will write when it **formats** or **clears** a disk. When **copying** a disk E-Copy will always write the boot-sector of the source disk.

empty (compatible) - will write an empty boot sector which has no boot-program or anything else.

anti virus booter - writes a small boot sector program to the disk which prints a re-assuring piece of text every time you boot with the disk in your drive. If you ever boot and find that the message is not shown then the boot sector must have been re-written.

This may be caused by a virus - at which point you should check your disk, using any of the popular virus checking programs. Disks formatted like this are still compatible with DOS computers.

external booter - this item is only used if you have a file named ECOPY.BOO in the same directory as ECOPY.PRG. This is a file which describes a boot sector, which can come from a variety of sources (anti-virus sectors, ram-testers, etc.)

A selection of these are included in the BOOTER folder on the E-Copy

disk - simply rename the one you want to use to ECOPY.BOO and copy it over. With this item selected any disks you formatted will use the boot-sector in the ECOPY.BOO file. If the boot sector is executable then use the **external booter, executable** option.

Load boot sector

This allows you to load any boot sector file during runtime, but only one at a time. The old one, if present, will be overwritten internally.

Save boot sector to file

To store your own boot sector file you need a disk containing the desired boot sector. Press this button and select a drive and a name for the file and press OK. The file should be exactly 512 bytes long.

Save Settings

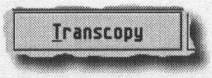
The current settings can be saved to the file ECOPY.INF in the home directory of E-Copy. If the file does not exist, a new one is created. If E-Copy is loaded, these saved parameters will replace the default settings. If the file does not exist E-Copy will use the default settings.

Actions

Copy

All source disk data will be copied byte-by-byte to the destination disk. If **Get disktype** or **Used only** are active, any manual settings have no effect. The format of the source disk is always analysed and will be used. Only the serial number of the destination disk is changed to enable the operating system to detect whether the disks have been changed or not. If the boot sector of the source disk was executable, the boot sector of the destination disk stays that way. There should be no problems for programs which are started by a boot sector as long as they do not have a copy protection.

Transcopy



This is a way of copying a source disk onto a disk with a different format (the one you have manually selected). The source disk is analysed and only the used sectors are read. Then the changes to the disk format (resulting from the different boot sector, FAT and directory size) are performed in memory and only the used sectors are written. The status of **Get disktype** and **Used only** does not matter. You can change the number of sectors, tracks and sides but for technical reasons not the cluster size, the source cluster size is used instead. If the used sectors of the source do not fit onto the selected format of the destination because too little sectors have been selected you will be prompted and the operation is cancelled.

Format

Formats the disk in the destination drive according to the format you have selected. **Get disktype** and **Format dest.** have no bearing on this operation. Disks are always formatted from the highest track to the lowest. This is to help save your data if you have started formatting the wrong disk - hit Escape and whip it out of the disk as fast as possible and you just might be able to get at the data.

Clear disk

The data on the destination disk is deleted by erasing the directory and the FAT on the disk. Erasing a few sectors is much faster than deleting every single file. If you are unaware of the format of a disk, choose **Get disktype** and then **Clear disk**. If there are marked bad sectors on the disk to be deleted, you will be asked by E-Copy if they should be also deleted. A **No** leaves them on the disk, otherwise E-Copy will attempt to delete them. This is unique on the Atari - as far as we know.

Read/Write

The **Read** button is the rather unpresuming gateway to one of the most powerful features of E-Copy. On the surface it enables you to **Read** in the contents of a disk and then **Write** (the button text will change) them out to another disk. So far, no difference from **Copy** apart from an extra click of the button. Where the power comes in is when you combine them with the following entries in the **Functions** pull-down menu.

Create Image file

After **Reading** a disk you can hit this option to create a file on your hard disk with an extender of .DIM (DiskIMage). This is a file which contains an exact replica of your source disk (data, boot sector, everything) and which may be read in with the following command.

Read Imagefile

This function will open up the file selector and will enable you to choose any of the .DIM files you have created with the **Create Image file** command. The **Write** button (which will appear) will then enable you to copy the original source disk (contained in this file) onto your destination disk. It shouldn't take too much of a leap of the imagination to see that you can keep a library of disks on your hard disk which you can write out at any time. This is a real boon for public domain libraries, software houses, etc.

To make things a little more automated you can set up *.DIM to be the start-up extender for ECOPY.PRG. This is commonly done with the **Install Application** function in various TOS versions and most alternative desktops - see your manual for more information. This will make it possible to double click on a .DIM file and automatically load E-Copy with the disk image in memory. You may also drag-and-drop .DIM files onto the E-Copy icon to perform the same function.

Clear buffer

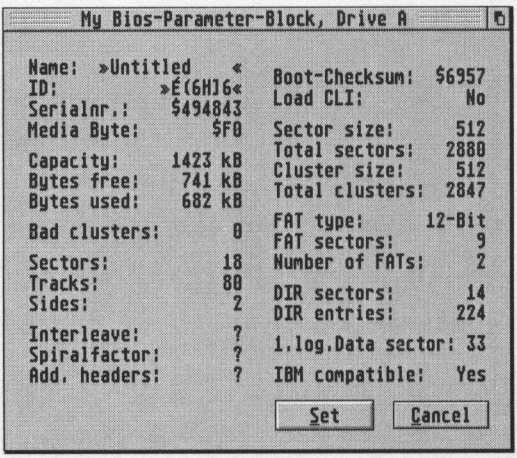
This clears and releases the internal buffer memory. **Write** becomes **Read** and you can start all over again.

Directory

This is an action found in the **Functions** pull-down menu. It shows the directory of your source disk with the file selector.

Analyse disk

Analyses and displays the data on the source disk. You can decide whether you want to keep the data manually with **Set**.



Name: Name (label) of a disk

ID: A code word, for example, LOADER. For a E-Copy formatted disk it is E-Copy. A DOS disk may contain a nonsense ASCII character in the first letter, because IBM disks do not use an ID and this may be part of an IBM jump commando e.g. $EB3E90.

Serialnr.: Every disk should have a different 24-bit serial number to enable the operating system to detect a media change.

Media byte: This byte in the boot sector enables some DOS versions to detect the format of a disk without actually analysing the real values in the boot sector. The following values are assumed by DOS:

Mediabyte	sectors	tracks	sides
$F0	18/36	80	2
$F8	9	80	1
$F9	9/15	80	2
$FC	9	40	1
$FD	9	40	2
$FE	8	40	1
$FF	8	40	2

Capacity: Total size in KBytes (=1024 bytes) including the administrating sectors.

Bytes free: Total amount of free KBytes

Bytes used: Total amount of used KBytes

Bad clusters: Number of marked bad clusters known to the FAT

Sectors: Number of sectors per track

Tracks: Number of tracks per side

Sides: Number of sides per disk

Interleave: This describes the number of rotations necessary to read all sectors of a track in the sense 1,2,3..., etc. Do not confuse this with the **Interleave factor** which describes the number added to number of a sector to get the number of neighbouring sectors. When a "0" appears, an error in the detection of the interleave has occurred. An example: the physical sequence of sectors is 1-7-2-8-3-9-4-10-5-11-6. That gives an interleave factor of 6 but the interleave is 2.

Spiral factor : This is the offset by which the physical sequence of sector numbers is shifted from one track to the next.

Additional headers: This shows whether or not a disk uses additional sectors.

Boot checksum: Shows up the checksum of the boot sector. If it is equal to $1234 it is executable, in addition a message **Executable boot sector** in lower characters appears.

Load CLI: Shows whether the Command-Line-Interpreter (normally COMMAND.PRG) is loaded after the booting procedure. This is comparable to the DOS prompt (COMMAND.COM).

Sector size: Size of a sector in bytes

Total sectors: Total number of physically present sectors

Cluster size: Size of a cluster in bytes. From that you can easily calculate the cluster size in sectors.

Cl. total: Total number of clusters available for storage of data.

Type of FAT: The number of bits a FAT entry occupies. TOS always assumes a 12bit FAT when drive A: or B: is selected because it does not know yet about modern ED drives. However, with 12bit you only can address 4096 clusters. ED disks with one sector per cluster exceed this limit. To tackle this problem there is a patch for the AUTO folder, it is found on the original E-Copy disk in the directory \EDPATCH\.

FAT-sectors: Number of sectors per FAT.

Number of FATs: Number of FATs on a disk (2 for ATARI and DOS).

DIR-sectors: Number of sectors for entries of the root directory.

DIR entries: As every file and folder of the root uses 32 bytes for the directories entries there is an upper limit of possible entries, which should not be exceeded. To store more files than that you should put them into folders, so they do not occupy space in the root.

1.logic data sector: Logic number of the first sector able to store data.

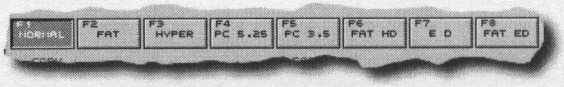
IBM compatible: Tells you if your disk conforms to the IBM standard.

Test disk

Another action in the **Functions** menu. The data on the source disk is read and checked for bad sectors. The memory display is replaced by a display showing the average reading speed in real-time. At the end of the test this average and the maximum is displayed again in the alert box so you can note it down. In case bad sectors have been detected you can decide whether to mark them in the FAT or not. If you decide to mark them, only unused sectors are marked because otherwise the chain of clusters would be interrupted and data would be lost.

The Standard Buttons

E-Copy has 8 freely definable buttons to enable you to setup your favourite formats.



Activate standard button

You can activate these by clicking on them with your mouse or by hitting the respective function keys (1-8). Try some of the predefined settings and you will see the following format parameters will be changed:

- **sectors/tracks/sides/cluster size**
- **fast format/verify/analyse target disk**
- all options in the **Formatting parameters** dialog

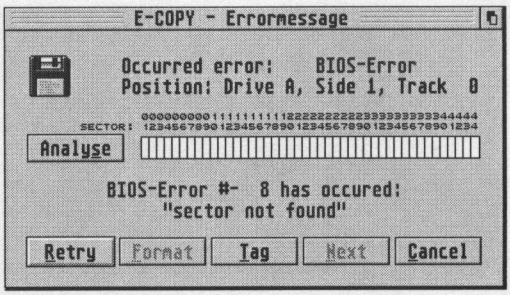
Set standard button

You may change the settings in these buttons by double-clicking on them and editing the dialog that appears accordingly. The various settings in the dialog should all be familiar to you now (if you have read the rest of this manual) and should require no further explanation. You can, however, change the name of the standard button to anything you wish - up to 7 characters.

By clicking on **Set** these settings will then be used - but you must also **Save Settings** to save them permanently.

Error Messages

E-Copy provides a convenient way to analyse errors should they befall you during any disk operation. You can then decide how to continue.



The top lines show the type of error and its position on the disk. There is also a tile bar, which will display every sector in the problematical track if you go on to use **Analyse**. Below there is a more detailed description of the error and the method used to correct it. If there is more than one error on a track only the last one that has occurred is displayed.

You then have the following options:

Analyse - E-Copy looks for a more precise position of the error by re-reading the bad track sector by sector and finally displaying it. An **[E]** (or a red tile in colour mode) indicates that this sector could not be read correctly. Sectors without errors are displayed in grey (green in colour mode).

Retry - Repositions the read/write head and repeats the attempt.

Format- This track will be formatted followed by the **Retry** operation.

Tag - Sectors recognised as bad will be tagged until the end of the operation, then they are marked as bad in the FAT of the disk to keep the operating system from storing any data in them.

Next- This button allows you to insert another disk when there has been error writing the destination disk. You can start from the beginning without having to read the source disk a second time.

Cancel- Stops the operation without confirmation.

APPENDIX

The Keyboard

You can control E-Copy nearly completely by keyboard. Some keyboard shortcuts are self-explanatory (see the underlined letters). The combination of this letter with [ALT] will start the function.

Additional shortcuts are:

Source drive:	[A][B]
Steprate of source:	[P]
Destination drive	[A][B] + [SHIFT]
Step rate of destination:	[P] + [SHIFT]
Sectors:	[+][-]
Tracks:	[;][-] + [SHIFT]
Sides:	[+][-] + [SHIFT]
Cluster-size:	[1][2] + [SHIFT]
activate standard button:	[F1] to [F8]
edit standard button:	[F1][F2] + [SHIFT]
Stop E-Copy while busy:	[ESC]

MSDOS compatibility

E-Copy formatted disks achieve a 99% MSDOS compatibility when you follow these rules:

1. DOS formats

sectors	tracks	sides	cluster-size	drive	computer
8/9	40	1/2	1	3.5"/5.25"	XT
9	80	1/2	2	3.5"/5.25"	AT/PS2
15	80	2	1	5.25"	AT
18	80	2	1	3.5"	PS2
36	80	2	1	3.5"	e.g. NeXT

2. To avoid starting an Atari boot program on a DOS computer keep the option **external booter** deactivated.

3. Do not use characters in filenames like ä, ü, ö, +, -, etc. because loading these under DOS will cause problems.

Tips and Tricks

Backdrop

E-Copy supports the new backdrop function of WinX and MuliTOS. A brief click with the mouse on the top window bar sends the window to the background. Under MagiC or MagiCMac you must use the backdrop icon.

How to copy disks of different systems

E-Copy is able to copy disks, which are not readable for TOS, for example, Spectre disks. But to do this you have to know the format of the alien disk. In case of spectre disks this is 10 sectors and 80 tracks.

1. Manually set these values in the main dialog (**Cluster-size** is not important here because there is no need to analyse the FAT).

2. Deactivate **Get disktype** to keep E-Copy from reading the administrating sectors. Now you can copy the disk.

How to find out about the physical layout of an alien disk

Disable the option **Get disktype** and set format parameters manually. Start test disk and when the first track has been read correctly break with [ESC] and increase the number of sectors by one, continue until an error is reported. Repeat this procedure for the number of sides, and the number of tracks until you work out the format.

System Solutions

E-COPY

Floppy Disk Copy Tool

for Atari ST–STE–TT–Falcon

Seriennummer: 40301092
Schluessel: IFYKKGBD

© 1993–96 by Robert Weiß

TDK
MICRO FLOPPY DISK
MF-2DD
Double Sided, Double Density
80Tracks-135TPI